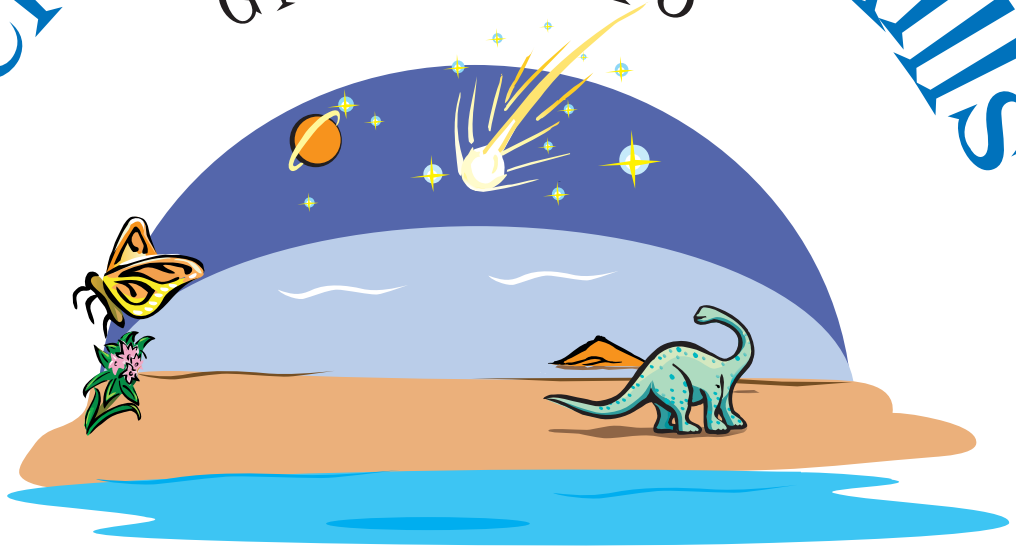
TeacherVision® Books

Science Lab Skills

Grades 6-10



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Contents

Name _____ **Date** _____ **Class** _____

LABORATORY SKILLS

Following Directions

1. Read all of the following directions before you do anything.

2. Print your name, last name first, then your first name and middle initial (if you have one), at the top of this page.

3. Draw a line through the word "all" in direction 1.

4. Underline the word "directions" in direction 1.

5. In direction 2, circle the words "your first name."

6. In direction 3, place an "X" in front of the word "through."

7. Cross out the numbers of the even-numbered directions above.

8. In direction 7, cross out the word "above" and write the word "below" above it.

9. Write "Following directions is easy" under your name at the top of this page.

10. In direction 9, add the following sentence after the word "page": "That's what you think!"

11. Draw a square in the upper right corner of this page.

12. Draw a triangle in the lower left corner of this page.

13. Place a circle in the center of the square.

14. Place an "X" in the center of the triangle.

15. Now that you have read all the directions as instructed in direction 1, follow directions 2 and 16 only.

16. Please do not give away what this test is about by saying anything or doing anything to alert your classmates. If you have reached this direction, make believe you are still writing. See how many of your classmates really know how to follow directions.

Name _____ Date _____ Class _____

LABORATORY SKILLS

Defining Elements of a Scientific Method

Laboratory activities and experiments involve the use of the scientific method. Listed in the left column are the names of parts of this method. The right column contains definitions. Next to each word in the left column, write the letter of the definition that best matches that word.

1. Hypothesis	**A.** Prediction about the outcome of an experiment
2. Manipulated Variable	**B.** What you measure or observe to obtain your results
3. Responding Variable	**C.** Measurements and other observations
4. Controlling Variables	**D.** Statement that sums up what you learn from an experiment
5. Observation	**E.** Factor that is changed in an experiment
6. Data	**F.** What the person performing the activity sees, hears, feels, smells, or tastes
7. Conclusion	**G.** Keeping all variables the same except the manipulated variable

Name _____ Date _____ Class _____

LABORATORY SKILLS

Analyzing Elements of a Scientific Method

Read the following statements and then answer the questions.

1. You and your friend are walking along a beach in Maine on January 15, at 8:00 AM.
2. You notice a thermometer on a nearby building that reads −1°C.
3. You also notice that there is snow on the roof of the building and icicles hanging from the roof.
4. You further notice a pool of sea water in the sand near the ocean.
5. Your friend looks at the icicles and the pool and says, "How come the water on the roof is frozen and the sea water is not?"
6. You answer, "I think that the salt in the sea water keeps it from freezing at −1°C."
7. You go on to say, "And I think under the same conditions, the same thing will happen tomorrow."
8. Your friend asks, "How can you be sure?" You answer, "I'm going to get some fresh water and some salt water and expose them to a temperature of −1°C and see what happens."

◆ Questions

A. In which statement is a **prediction** made?

B. Which statement states a **problem**?

C. In which statement is an **experiment** described?

D. Which statement contains a **hypothesis**?

E. Which statements contain **data**?

F. Which statements describe **observations**?

Name _____ Date _____ Class _____

LABORATORY SKILLS

Performing an Experiment

Read the following statements and then answer the questions.

1. A scientist wants to find out why sea water freezes at a lower temperature than fresh water.
2. The scientist goes to the library and reads a number of articles about the physical properties of solutions.
3. The scientist also reads about the composition of sea water.
4. The scientist travels to a nearby beach and observes the conditions there. The scientist notes the taste of the sea water and other factors such as waves, wind, air pressure, temperature, and humidity.
5. After considering all this information, the scientist sits at a desk and writes, "If sea water has salt in it, it will freeze at a lower temperature than fresh water."
6. The scientist goes back to the laboratory and does the following:
   - **a.** Fills each of two beakers with 1 liter of fresh water.
   - **b.** Dissolves 35 grams of table salt in one of the beakers.
   - **c.** Places both beakers in a freezer at a temperature of −1°C.
   - **d.** Leaves the beakers in the freezer for 24 hours.
7. After 24 hours, the scientist examines both beakers and finds the fresh water to be frozen. The salt water is still liquid.
8. The scientist writes in a notebook, "It appears that salt water freezes at a lower temperature than fresh water does."
9. The scientist continues, "I suggest that the reason sea water freezes at a lower temperature is that sea water contains dissolved salts, while fresh water does not."

◆ Questions

A. Which statement(s) contain **conclusions**?

B. Which statement(s) contains a **hypothesis**?

C. Which statement(s) contain **observations**?

D. Which statement(s) describe an **experiment**?

E. In which statement is the **problem** described?

F. Which statement(s) contain **data**?

G. Which is the **manipulated variable** in the experiment?

H. What is the **responding variable** in the experiment?

Name _____ Date _____ Class _____

LABORATORY SKILLS

Identifying Errors

Read the following paragraph and then answer the questions.

Andrew arrived at school and went directly to his earth science class. He took off his cap and coat and sat down at his desk. His teacher gave him a large rock and asked him to find its density. Realizing that the rock was too large to work with, Andrew got a hammer from the supply cabinet and hit the rock several times until he broke off a chip small enough to work with. He partly filled a graduated cylinder with water and suspended the rock in the water. The water level rose 2 cm. Andrew committed this measurement to memory. He next weighed the rock on a balance. The rock weighed 4 oz. Andrew then calculated the density of the rock as follows: He divided 2 cm by 4 oz. He then reported to his teacher that the density of the rock was .5 cm/oz.

◆ Questions

1. What safety rule(s) did Andrew break?

_____

_____

2. What mistake did Andrew make using measurement units?

_____

_____

3. What should Andrew have done with his data rather than commit them to memory?

_____

_____

4. What is wrong with the statement "He next weighed the rock on a balance"?

_____

_____

5. Why is "4 oz" an inappropriate measurement in a science experiment?

_____

_____

6. What mistake did Andrew make in calculating density?

_____

_____

Name _____ Date _____ Class _____

LABORATORY SKILLS

Following Directions

This skills sheet helps reinforce students' appreciation of the need to read all directions before beginning an investigation. Use this skills sheet before your students begin work in the laboratory.

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A	**1.** Hypothesis	**A.** Prediction about the outcome of an experiment
E	**2.** Manipulated Variable	**B.** What you measure or observe to obtain your results
B	**3.** Responding Variable	**C.** Measurements and other observations
G	**4.** Controlling Variables	**D.** Statement that sums up what you learn from an experiment
F	**5.** Observation	**E.** Factor that is changed in an experiment
C	**6.** Data	**F.** What the person performing the activity sees, hears, feels, smells, or tastes
D	**7.** Conclusion	**G.** Keeping all variables the same except the manipulated variable

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LABORATORY SKILLS

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7. You go on to say, "And I think under the same conditions, the same thing will happen tomorrow."
8. Your friend asks, "How can you be sure?" You answer, "I'm going to get some fresh water and some salt water and expose them to a temperature of −1°C and see what happens."

◆ Questions

A. In which statement is a **prediction** made? 7

B. Which statement states a **problem**? 5

C. In which statement is an **experiment** described? 8

D. Which statement contains a **hypothesis**? 6

E. Which statements contain **data**? 1, 2, 3, 4

F. Which statements describe **observations**? 2, 3, 4

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LABORATORY SKILLS

Performing an Experiment

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9. The scientist continues, "I suggest that the reason sea water freezes at a lower temperature is that sea water contains dissolved salts, while fresh water does not."

◆ Questions

A. Which statement(s) contain **conclusions**? 8, 9

B. Which statement(s) contains a **hypothesis**? 5

C. Which statement(s) contain **observations**? 4, 7

D. Which statement(s) describe an **experiment**? 6 a–d

E. In which statement is the **problem** described? 1

F. Which statement(s) contain **data**? 4, 6 a–d, 7

G. Which is the **manipulated variable** in the experiment? the amount of salt in water

H. What is the **responding variable** in the experiment? the temperature at which water freezes

Name _____ Date _____ Class _____

LABORATORY SKILLS

Identifying Errors

Read the following paragraph and then answer the questions.

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◆ Questions

1. What safety rule(s) did Andrew break?

He didn't put on his safety goggles. Also, he didn't obtain permission from his teacher before obtaining the hammer and breaking the rock.

2. What mistake did Andrew make using measurement units?

He used linear units (centimeters) instead of volumetric units (milliliters).

3. What should Andrew have done with his data rather than commit them to memory?

He should have kept a written record.

4. What is wrong with the statement "He next weighed the rock on a balance"?

A balance is used to determine mass, not weight.

5. Why is "4 oz" an inappropriate measurement in a science experiment?

Metric units (grams) should be used.

6. What mistake did Andrew make in calculating density?

Density is expressed in mass per unit volume (g/mL), not length per unit weight.